



Hands at Work

Occupational Carpal Tunnel Syndrome in Massachusetts

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Summer 1997

Carpal Tunnel Syndrome in Young Workers

Carpal tunnel syndrome (CTS) is commonly considered a disease of middle age.⁶ Findings from the Massachusetts surveillance system for work-related CTS suggest that young people may develop this condition when exposed to risk factors at work. Since March 1992, the Massachusetts Department of Public Health (MDPH) has identified over 200 cases of work-related CTS among individuals younger than age 25. The Wisconsin Department of Health, which also conducts surveillance of work-related CTS, has likewise identified a surprising number of young cases. CTS in young individuals who are at the beginning of their working lives raises particular concern because of the potential long term impact of lost or diminished hand function on employment and career options as well as on overall quality of life.

MDPH has conducted surveillance of work-related CTS since 1992 when public health regulations were promulgated requiring physicians to report all confirmed and suspected cases of work-related CTS to the Department's Occupational Health Surveillance Program (OHSP). Physician reports, together with workers' compensation claims for CTS filed with the Massachusetts Department of Industrial Accidents, are used to document the extent of work-related CTS in Massachusetts and the industries, occupations and circumstances where prevention programs to reduce ergonomic hazards are needed. This issue of *Hands at Work* highlights surveillance findings regarding young workers diagnosed with CTS.

During the first three and a half years of surveillance (March 1992 through December 1995), MDPH identified 3,343 unique cases of work-related CTS ascertained through workers' compensation and physician reports. Of these, 202 were individuals younger than age 25. Most of these young workers were in their early 20's, although 17 were teenagers. Three quarters of these young cases were female, which is similar to the gender distribution for cases of all ages.

Also in this issue:

- A Fact Sheet on Workstation Design
- An Update on "Ergonomic" Keyboards
- A Summary of Work-Related CTS Cases Reported to Date

CASE EXAMPLES

● A 22 year old female was diagnosed with CTS in her right hand which she attributes to her three years of work for a company that manufactures printing plates and cutting dyes. She works in the company's office using the computer and adding machine most of the day. Nerve conduction studies confirmed her diagnosis of CTS and she underwent surgery in her right hand. Her employer has made changes to her job as a result of the diagnosis.

● A 22 year old female hair stylist was reported with bilateral CTS after several years of cutting, shampooing, perming, and blow drying hair. She has had surgery on her right hand. She continues to be employed by the same hair salon although she has had to limit the number of clients she can see in a day, reducing her income significantly.

● A 24 year old male was diagnosed with work-related CTS after working at a car wash facility where he was responsible for washing and vacuuming cars and for machinery maintenance. He described a number of activities he can no longer do with his hands without pain, including writing letters and driving a car.

● A 22 year old female was reported with bilateral CTS after working for a large grocery chain. She reported that her job duties included cashiering, counting thousands of dollars every day, bagging groceries and using the computer. She has had carpal tunnel release surgery on her right hand.

Where Are the Young Cases Working?

The largest number of young cases (28%) were employed in the manufacturing sector including, for example, the manufacture of candles, rubber and plastics, paper products, and apparel (Table 1). Retail trade, which includes restaurants as well as stores, followed manufacturing with the second largest number of cases (22%). As shown in Table 1, the single industry with the largest number of cases was food stores with 28 or 14% of all the young cases. All but five of the cases employed in food stores worked as cashiers. Approximately 20% of the young cases were employed in the service sector, including hospitals, nursing homes and beauty salons. Compared to cases of all ages, the young workers were much more likely to be employed in retail industries.

What Tasks Are Putting Young Workers at Risk of CTS?

Information about occupations provides a better sense of the types of tasks workers are performing and the potential risk factors for repetitive strain injuries. Of the 145 young cases for whom occupational information was available, the largest proportion (43%) worked in technical sales and administrative support positions - predominately as cashiers, sales workers, secretaries, data entry keyers and typists (Figure 1). The second most common occupational category was machine operator/assembler, which included 29% of the young cases. These findings are consistent with previous reports in the occupational medicine literature that those employed in cashiering, administrative occupations and assembly occupations are at risk of developing CTS.^{1,2,3,4,5,7}

Table 1

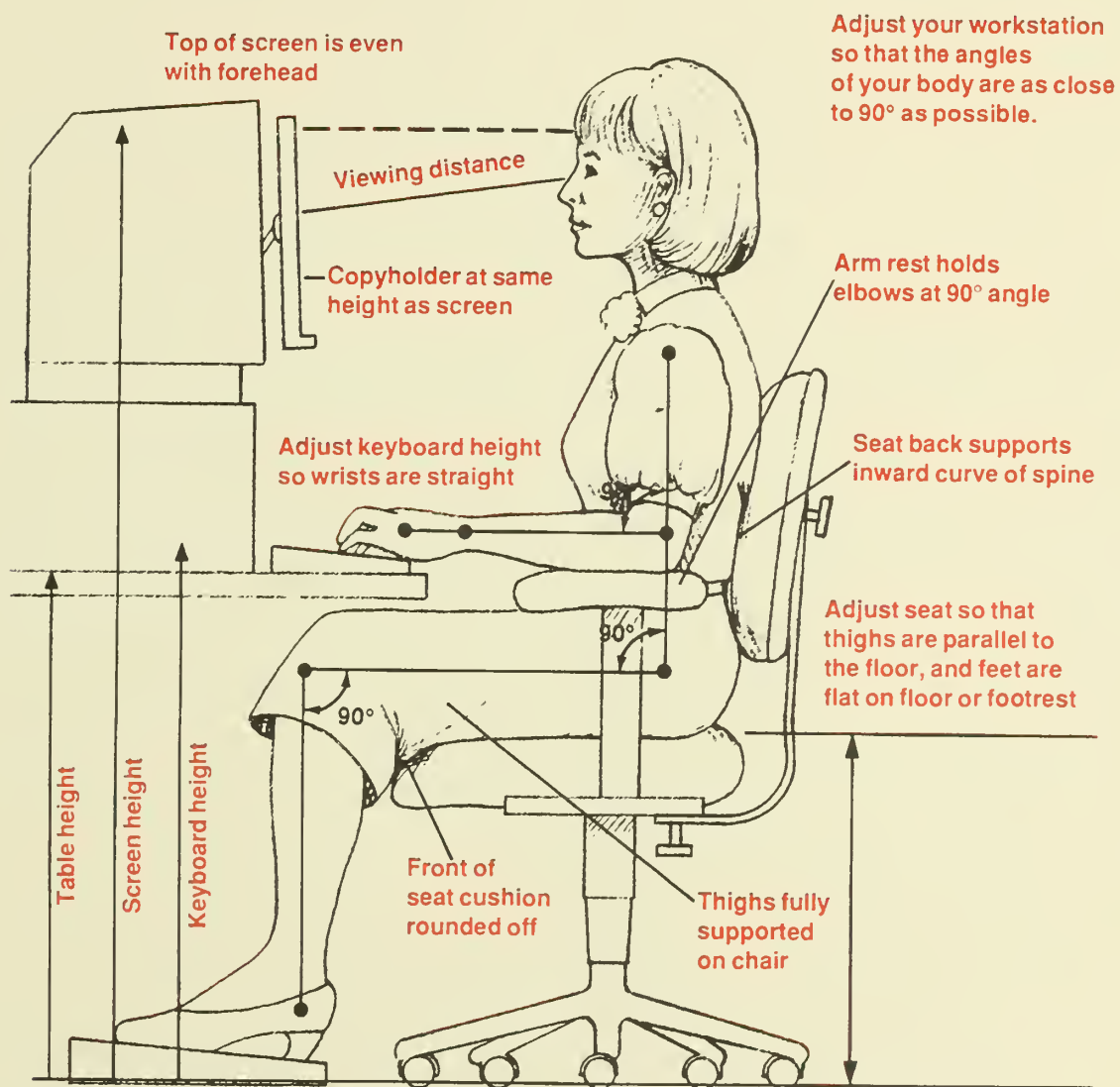
Industry Distribution of Work-Related CTS Cases <25 Years of Age Leading Industries (5 or more cases) Within each General Category

Description	N	%
Total	197*	100
All Manufacturing	57	28.9
Candle manufacturing	11	
Rubber and misc. plastics	8	
Paper and allied products	6	
Printing, publishing and allied industries	5	
Apparel and other finished products	5	
All Retail Trade	45	22.8
Food stores (grocery stores and bakeries)	28	
Eating and drinking places	5	
Department stores	5	
All Services	41	20.8
Health services (hospitals, offices and clinics, nursing homes)	12	
Business services (mail advertising, computer programming, personnel supply)	7	
Beauty shops or salons	6	
All Finance, Insurance and Real Estate	21	10.7
Insurance agents, brokers and service	7	
Insurance carriers	7	
Banks	6	
All Wholesale Trade	11	5.6
Durable Goods	6	
Non-durable goods (art goods, gifts and novelties)	5	
All Transportation and Utilities	10	5.1
All Other	13	6.3

* 8 cases unclassifiable

Preventing Repetitive Strain Injury Through Workstation Design

Guidelines for Setting Up Your Ergonomic Workstation:



Preventing Repetitive Strain Injury Through Workstation Design

ADJUSTING YOUR WORKSTATION TO PREVENT REPETITIVE STRAIN INJURIES

In this technological age, many people find themselves spending a major part of each day working at a video display terminal. Long hours spent sitting still and looking intently at a monitor can lead to various health problems including eyestrain and repetitive strain injuries (RSI), such as nerve compression in the wrist (carpal tunnel syndrome). Adjusting your computer workstation correctly can help to reduce the risk of RSIs. The information provided in this fact sheet should be used as a guideline for creating workstations that properly fit your individual body and work requirements.

Every person is different. Workstations should be adjustable to reduce the physical stress and strain on each individual worker. Look for these common problem areas:

- a chair with arms at a height that interferes with typing at the terminal
- a monitor that is too high or too low
- bad lighting, causing glare on the screen
- a desk that is too high so that shoulders and arms are raised uncomfortably
- keyboard height that causes wrist extension

In addition to proper workstation design, work pace and proper work methods, such as varying tasks throughout the day, need to be considered when attempting to reduce the risk of RSIs.

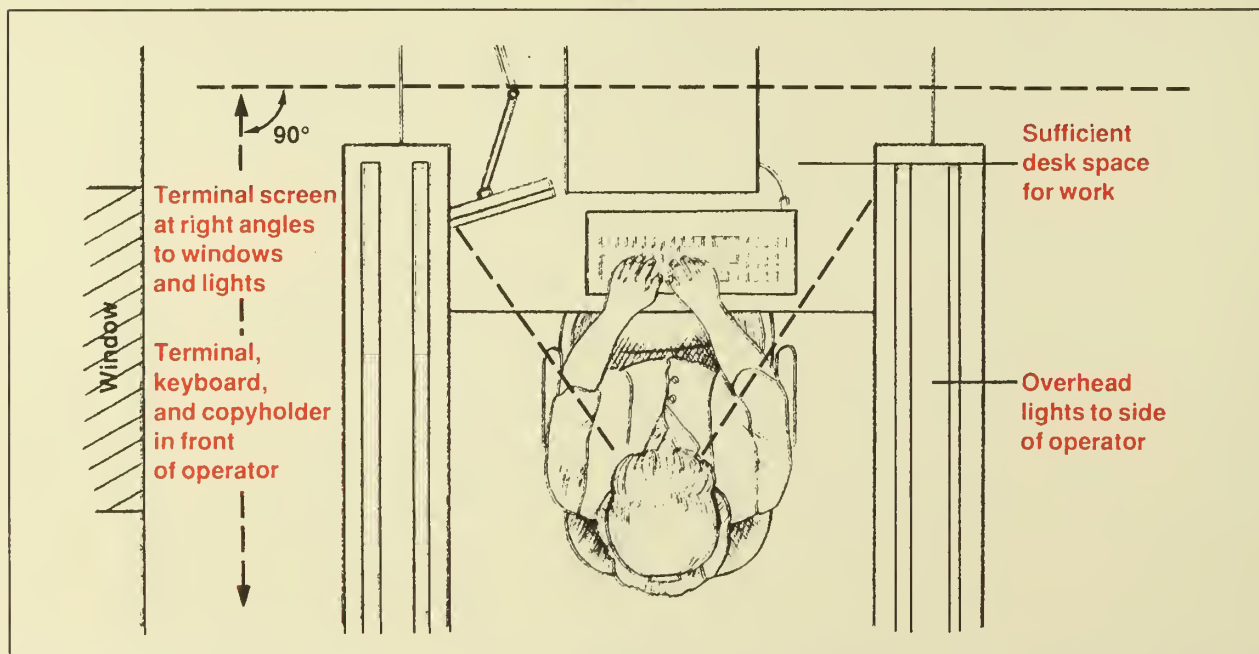
The National Institute for Occupational Safety and Health recommends that video display terminal workstations and equipment allow computer operators to be able to adjust:

- Keyboard height
- Screen height
- Screen brightness and contrast
- Leg room
- Viewing distance (18" to 28")
- Lighting levels
- Chair seat, backrest, armrest heights
- Footrest height
- Document placement and angle

Indirect or recessed lighting should be used to control screen glare and windows should be shielded to reduce direct sunlight. Hoods over screens may be used as needed.

If turning is part of the job, swivel chairs should be provided. Chairs should be stable, with five or six point bases, and should move easily.

Look at the following diagrams to see the best ways to adjust your workstation. Readjust your terminal and furniture at the beginning of each work period if you share a computer with someone else; the other person probably won't be exactly the same size you are.



Reporting Guidelines for CTS:

All physicians practicing in Massachusetts are required under 105 CMR 300.00 to report certain occupational diseases and injuries, including work-related carpal tunnel syndrome, to the Massachusetts Department of Public Health (DPH). These reporting requirements are part of a national effort to document the incidence of occupational diseases, injuries, and exposures with the goal of preventing work-related health problems.

Physicians should report any patient with a confirmed or suspected diagnosis of carpal tunnel syndrome AND a history of a job involving:

- frequent repetitive movements, awkward postures or forceful exertions of the hand(s) or wrist(s); or
- regular use of vibrating tools; or
- prolonged pressure over the wrist(s) or palms

*Selected References

- ¹ Baron S, Habes D. Occupational musculoskeletal disorders among supermarket cashiers. *Scand J Work Environ Health* 18 Suppl 2:127-9, 1992.
 - ² Bernard B, Sauter S, Fine L, Petersen M, Hales T. Job task and psychosocial risk factors for work-related musculoskeletal disorders among newspaper employees. *Scand J Work Environ Health* 20:417-26, 1994.
 - ³ Hales T, Sauter S, Peterson M, Fine L, Putz-Anderson V, Schleifer L, Ochs T, Bernard B. Musculoskeletal disorders among visual display terminal users in a telecommunications company. *Ergonomics* Vol. 37, No. 10:1603-1621, 1994.
 - ⁴ Harber P, Bloswick D, Beck J, Pena L, Baker D, Lee J. Supermarket Checker Motions and Cumulative Trauma Risk. *JOM* Volume 35, Number 8: 805-811, August 1993.
 - ⁵ Margolis W, Kraus J. The Prevalence of Carpal Tunnel Syndrome Symptoms in Female Supermarket Checkers. *Journal of Occupational Medicine* Volume 29, No.12: 953-956, December 1987.
 - ⁶ Phalen George S. The Carpal Tunnel Syndrome: Clinical Evaluation of 598 Hands. *Clinical Orthopedic and Related Research* 83: 29-40, 1972.
 - ⁷ Tanaka S, Wild D, Seligman P, Behrens V, Cameron L, and Putz-Anderson V. The US prevalence of self-reported carpal tunnel syndrome: 1988 national health interview survey data. *Am J of Public Health* 84(11):1846-1848, 1994.
- *Additional references available upon request. Contact MDPH Occupational Health Surveillance Program: (617)624-5624

Request for Information

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ Fax: _____ Medical Specialty: _____

Detach form and send to:
Massachusetts Department of Public Health
Occupational Health Surveillance Program
 250 Washington Street, 6th floor
 Boston, MA 02108-4616

Please Send:

(617) 624-5632 fax: (617) 624-5696

_____ Additional Case Report Forms and Reporting Guidelines

_____ Resource Guide to Occupational Health Information and Services in Massachusetts

_____ Additional copies of the fact Sheet on ergonomic design of a workstation: _____ # of copies

Looking at occupations within industries provides more precise information for targeting interventions (Figure 2). While the majority of cases within manufacturing were machine operators/assemblers, a substantial proportion worked in sales and administrative support jobs. These jobs include mostly sales workers, receptionists and shipping and receiving clerks. Efforts to reduce repetitive strain injuries within manufacturing industries should address risk factors not only in manufacturing facilities but also in company offices.

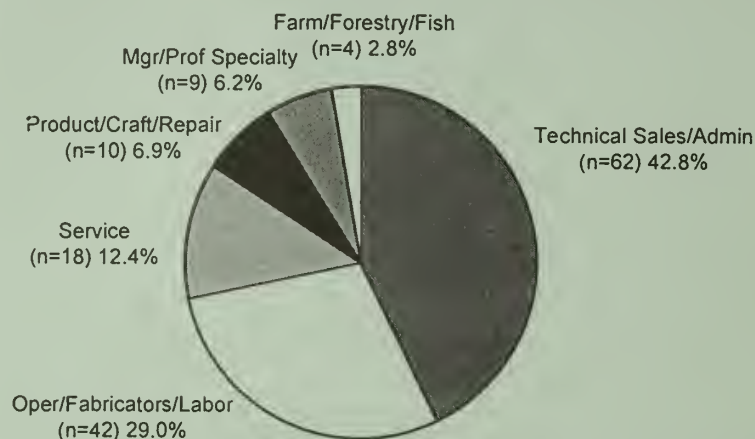
Within retail trade, most young cases (70%) were employed as clerks or cashiers. In the service sector, several occupations stood out: hairdressers and health aides and food preparers working in nursing homes and hospitals. Most of the young cases in finance/insurance industries were either bank tellers, data entry keyers, insurance adjusters or computer operators. Notably, sales and administrative support jobs accounted for a minimum of 20% of the cases across all industry groups.

Additional Information Collected on Interviews with Young Cases

Follow-up interviews were conducted with a subset of 40 young cases. While the information from these interviews is not necessarily representative of all young cases, it nevertheless provides some interesting insights. Of the 40 interviewed cases, 60% reported bilateral CTS and 37% had undergone CTS surgery. Only one case reported an acute injury leading to development of CTS. In addition, most of the cases (75%) reported that they received no information from their employers about the causes of carpal tunnel syndrome and how to prevent hand/wrist problems at work.

Figure 1

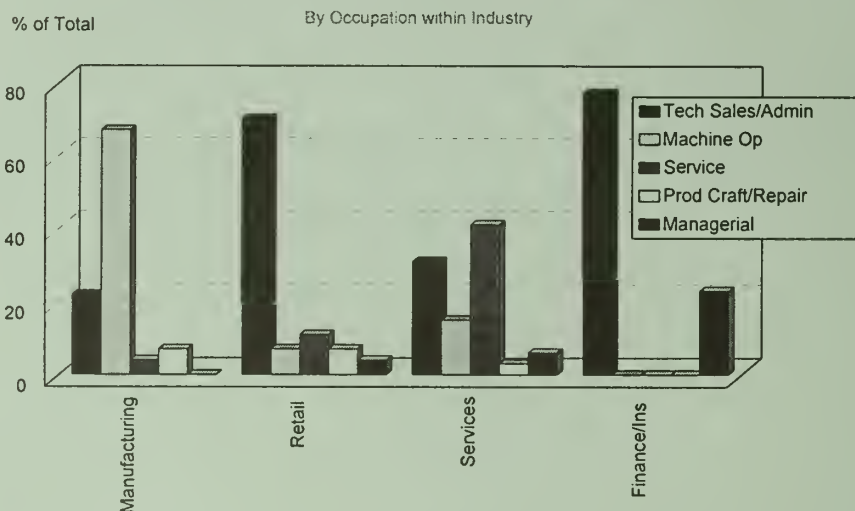
Occupation Distribution of Work Related CTS Cases Less than 25 Years Old
N=145*



* 61 occupations missing

Figure 2

Distribution of Work Related CTS Cases < 25 years old



There is very little in the published literature about CTS in young people. While studies of occupational groups have previously identified cases in the young population, the focus has largely been on older age groups. Findings from Massachusetts and Wisconsin have helped highlight that young workers are potentially at risk and underscore the need for further research on the length of exposure leading to disease and the long-term impact of developing this condition early in one's working life. These findings also underscore the need for interventions that reduce ergonomic risk factors for workers of all ages.

We thank Massachusetts health care providers for reporting cases of confirmed or suspected work-related CTS to MDPH and welcome your thoughts or comments regarding carpal tunnel syndrome in young workers.

Should I Buy an "Ergonomic" Computer Keyboard?

Laura Punnett, Sc.D.

A number of keyboard manufacturers have designed new "ergonomic" keyboards that are intended to reduce the likelihood of a user developing carpal tunnel syndrome, tenosynovitis, or similar conditions. These keyboards vary in their features. Some are split in the middle and curved, others are tilted upward or swung outward. Often these dimensions are adjustable. These designs also vary in the forces required to activate the keys and some provide audible feedback when activated. On some of the new keyboards the actual key layout has been changed; instead of the standard formation called the "QWERTY" pattern, another layout, such as the "Dvorak" pattern may be used, or certain keys may be programmed for the operation of multiple keys simultaneously (eg., chording).

The effectiveness of these keyboards to reduce injury has yet to be determined. The few comparisons or evaluations of new keyboards that have been published focus primarily on the length of time required to retrain oneself and whether there are changes in users' productivity. One pair of relatively small studies, recently reported by a group of California researchers, showed that some keyboard users with upper extremity disorders did experience improvements in symptoms or hand function after 12 weeks of using keyboards with a "softer touch" or with "alternative" angles (tenting, slope, etc.). However, there have been no large-scale or long-term epidemiologic studies to date, and none (that we know of) have assessed the potential of these keyboards in creating new disorders among users.

Nevertheless, there is a strong logic behind the development of many of these alternative devices. Ergonomic problems associated with keying on a traditional, flat one-piece, parallel-row keyboard with the standard QWERTY layout were first identified at least 70 years ago, long before the invention of electronic keyboards. These problems include static non-neutral wrist, arm, shoulder and finger postures necessary to hold the arms and hands over the keyboard. Loading of the shoulder and arm muscles and eventually fatigue and discomfort result. Therefore, keys that require less force to activate will result in lower levels of exertion by the operator. In addition, the standard QWERTY key layout results in distribution of activity among the fingers that is disproportionate to their relative strengths (i.e., more activity by the left hand than the right and more activity by smaller, weaker fingers). Recent laboratory studies show that increases in electrical muscle activity and in carpal tunnel pressures are caused by finger keying motions as well as non-neutral wrist postures.

Dr. Punnett is Associate Professor in the Department of Work Environment, University of Massachusetts Lowell. She is also Co-Director of the Lorin Kerr Ergonomics which conducts research and provides technical assistance throughout the region on the health, safety, and productivity consequences of designing (or failing to design) jobs to fit human needs.

**Summary Of Work-
Related CTS Reports
(March 1992-June 1996):**

Physicians in Massachusetts have been required since March 1992 to report cases of work-related CTS to the Department of Public Health (MDPH). In July 1993 MDPH also began collecting Massachusetts workers' compensation claims and First Reports of Injury for CTS from the Massachusetts Department of Industrial Accidents. Between March 1992 and June 1996, 4172 cases of work-related CTS were identified through both ascertainment sources; 1108 physician case reports and 3064 workers' compensation cases with only 6% overlap. A current study is underway to compare the demographic characteristics of workers' compensation and physician reported cases. Over 70% of both populations are female and about 6% of both populations are under the age of 25. The demographic characteristics of the cases in each system appear to be similar as to age and gender. Industry distribution varies somewhat with a slightly higher percentage of cases from the retail and service industries being identified through workers' compensation case reports and a slightly higher percentage of manufacturing cases coming from physician reported records. Occupation distribution is roughly the same for both sources. As suspected, workers' compensation appears to capture a higher rate of cases who report bilateral disease and who have had surgery.

	March 1992 through June 1996
Total Reports <small>* includes 241 cases from both sources</small>	4172*
Workers' Compensation	3064
Physician Reported	1108

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